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THE JOURNAL
OF
THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

DEVOTED TO THE ADVANCEMENT OF ASTRONOMY AND ALLIED SCIENCES

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Articles PAGE

Annual At-Home of the Royal Astronomical Society (with Plates VI, VII):
- The Chant Medal—First Award to Bertram J. Topham 89
- Reply by Mr. Topham 93
- Presentation of Facsimile to Prof. C. A. Chant—Mr. Andrew Thomson's Address and Professor Chant's Reply 94
- Recollections of Astronomy in Canada by Prof. Chant 97
- Experimental Demonstrations by Prof. Ainslie 104

Annual General Meeting of the R.A.S.C.
- Minutes of the Meeting by the Recorder 105
- General Secretary's Report 107
- Report of the Librarian 110
- Reports of the Secretaries of the Centres 111
- General Treasurer's Report 120
- Reports of the Treasurers of the Centres 121
- Officers of the Centres for 1941 125

Recently Elected Members at Large 127

Notes and Queries
- Sparkling Sirius—The last Sun-spot Maximum—Red Rays and Fog 128

Meetings of the Society
- At Toronto—At Vancouver—At Winnipeg—At Ottawa 130

A Greek Astronomer's Appeal 136

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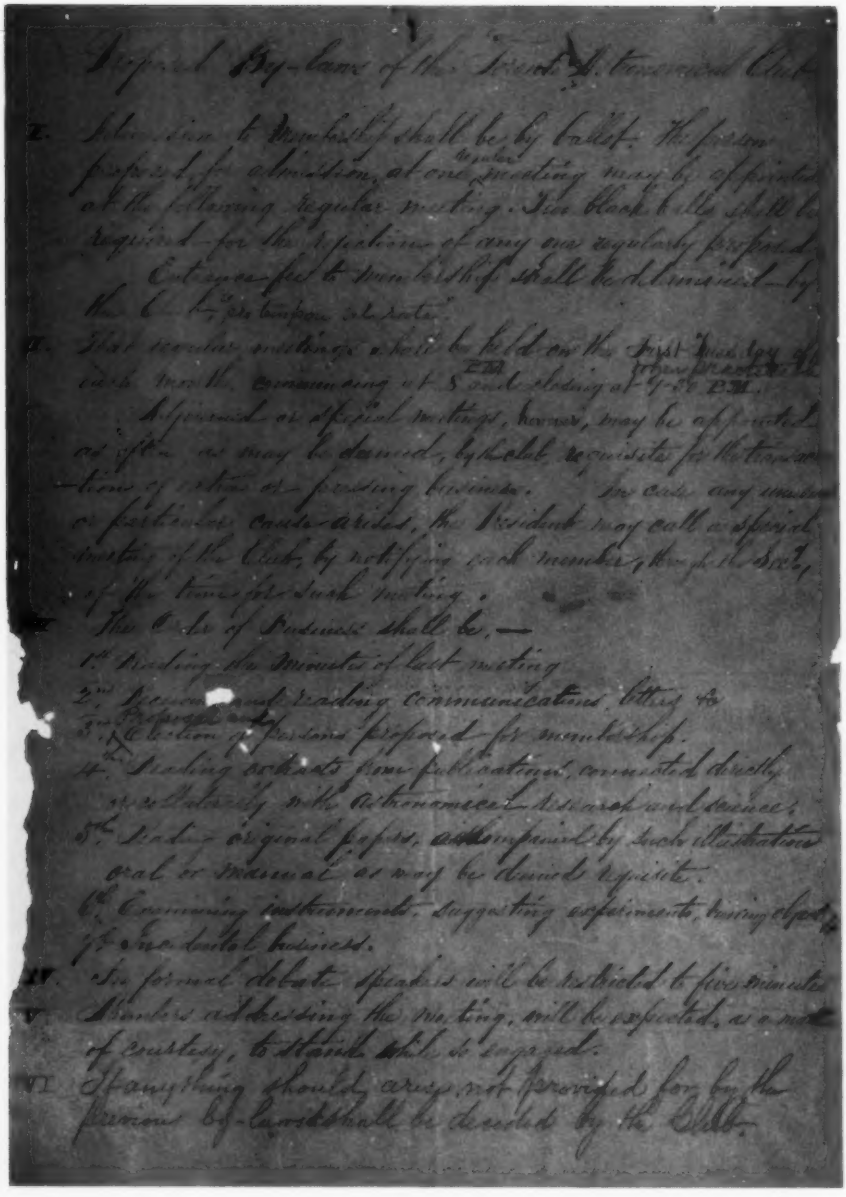

Proposed By-laws of the Toronto Astronomical Club

I. Election to Membership shall be by Ballot. The name proposed for admission, at one regular meeting may be appointed at the following regular meeting. Two black balls shall be required for the rejection of any one regularly proposed. Evidence fit to warrant the rejection shall be determined by the Council for the purpose aforesaid.

II. That regular meetings shall be held on the first Thursday in each month commencing at 8 o'clock and closing at 10-30 P.M. Adjourned or special meetings, however, may be appointed as often as may be deemed by the Club requisite for the transaction of urgent or pressing business. In case any unusual or particular circumstances should arise, the President may call a special meeting of the Club by notifying each member by post at least 24 hours of the time for such meeting.

III. The Order of Business shall be,—
1st Reading the Minutes of last meeting
2nd Reports and reading communications, letters &c
3rd Election of persons proposed for membership.
4th Reading papers on Astronomical subjects, communicated directly or indirectly with the Astronomical Research and Science.
5th Reading original papers, accompanied by such illustrations oral or manual as may be deemed requisite.
6th Examining instruments, suggesting experiments, hearing reports &c and other business.

IV. In formal debate speakers will be restricted to five minutes.

V. Members addressing the Meeting, will be expected, as a matter of courtesy, to stand while so engaged.

VI. If anything should arise, not provided for by the previous By-laws, it shall be decided by the Club.

The Original Draft of the Constitution of The Toronto Astronomical Club.
(See Footnote on page 92)

PLATE VII

THE CHANT MEDAL
Founded in 1940. The medal is of silver.
(Reproduction natural size.)

Journal of the Royal Astronomical Society of Canada, 1941.

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ANNUAL AT-HOME

(With Plates VI, VII)

THE annual At-Home of the Royal Astronomical Society of Canada was held in the Physics Building of the University of Toronto at 8.00 p.m., January 21, 1941. The chair was taken by Dr. Frank S. Hogg, the newly-elected president of the Society, who welcomed the members and their friends, numbering about one hundred and fifty.

The first portion of the programme was the first presentation of the Chant Medal which was established by the Council in 1940. It had been hoped that Prof. H. R. Kingston, of London, the chairman of the committee charged with the duty of choosing the person who should receive the award, would be present, but he was unable to come to Toronto for the occasion. However, he had forwarded to the Council, through the General Secretary, the result of the voting by the members of the committee. The chairman asked Mr. E. J. A. Kennedy, the General Secretary, to give an account of the founding of the medal and a statement of the reasons which had been put forward in support of the candidate who had been selected for the award.

The Chant Medal—Statement by the General Secretary

There is a mistaken notion, held by a great number of people, that to obtain a knowledge of the stars and of the celestial phenomona in general one must be initiated into the intricacies of higher mathematics. This misunderstanding has kept thousands from an enjoyment of the beauties of nature as spread out in the heavens. I may repeat an oft-quoted remark, "As well insist that a course in

botany is needed to enjoy the fragrance and loveliness of the flowers of the earth."

The Royal Astronomical Society of Canada is a group of enthusiasts whose chief desire is to have others taste and experience the joys of an entrancing subject. The great majority of the group, which now approaches the thousand-mark, are just common folk, plain amateurs, but they take great pride in numbering in the membership all the professional astronomers in Canada and, of course, the contributions and help from the latter can scarcely be estimated.

As the membership has grown, the Council of the Society has concerned itself with the thought of stimulating increased effort in observation and research among the purely amateur members, and so in our Jubilee Year just concluded, the Chant Medal was established, the award of the medal to be based on the value of the work of the applicant to the science of astronomy and closely allied fields of original investigation. The method of procedure in choosing the recipient as approved by the Council is to call for nominations from all parts of Canada, to be made in detail on special forms prescribed.

The Committee of Award was chosen by the Council from among the outstanding astronomers in Canada, viz.:

Prof. H. R. Kingston, Head of the Department of Mathematics and Astronomy, Western University, London. (Chairman)

Dr. J. A. Pearce, Head of the Dominion Astrophysical Observatory, Victoria, B.C.

Mr. R. M. Stewart, Dominion Astronomer, Ottawa.

Prof. R. K. Young, Director of the David Dunlap Observatory, Richmond Hill.

One of our distinguished amateurs and a well-known contributor to the JOURNAL published by the Society, Mr. Boyd Brydon, put forward in a very interesting way, the proposition that astronomy is the perfect hobby, and in his characteristic style asked, "Why not try it?" He gave many reasons, which I cannot take time to enumerate, but I wish to tell you of the very pleasant duty that falls to me as General Secretary of the Society, namely, to introduce to you one who has tried it and has found not only a perfect hobby, but fame and honour as well. I am sure he will tell you of the joy he has experienced in discovery—discovery of objects far out in space—

objects which his eyes were in some cases probably first to glimpse, certainly first to determine their character. He may also tell you of his added pleasure in sharing his knowledge with others, especially in showing through his telescope the wonders of the heavens.

The first award of the Chant Medal has been adjudged by the Committee to Mr. Bertram J. Topham. He was nominated as a candidate by Dr. Frank S. Hogg, and I shall read the reasons given in his application. Mr. Topham was born in England and was educated there in a day school and in a night trade school as machinist and electrician. He spent five years as artilleryman with the Canadian forces in France, 1914-1919, and was awarded the D.C.M. in 1916. He is an electrician in an industrial firm, and has acquired scientific experience in the construction and maintenance of his private Castlefield Observatory at Fairbank P.O., Toronto, Ontario.

Dr. Hogg gives the following statement of Mr. Topham's work:

Mr. Topham's work in astronomy is distinguished by his enthusiasm and skill, as well as by the number of fields in which he is active. He has made substantial contributions in research programmes, in instrument construction, and in the popularization of astronomy.

A. Research Programmes

1. *Variable Star Observations.* Mr. Topham started making observations for the American Association of Variable Star Observers in the spring of 1937. I have several times been told that his observations are unusually precise, and are regarded as among the best sent in to the Secretary. He has already submitted 1,335 observations. It should be also noted that due to Topham's good equipment (6½-inch refractor) he tends—according to AAVSO policy—to work on rather faint variables. This means that the setting, identification, and estimation are slower and more difficult than for brighter variables. (Enclosed is a letter from Professor Leon Campbell, Recorder of the AAVSO.)

2. *Aurora Borealis.* Mr. Topham has long recorded various auroral phenomena. When the National Geographic-Cornell University programme was called to his attention he immediately undertook to collaborate. He ranks among the top observers on this continent, and his services have been acknowledged by his appointment as a member of the Committee on Auroral Observations of the AAVSO. Dr. Gartlein, also a member of this committee, and originator of this programme, writes the enclosed letter.

3. *Meteors.* Mr. Topham has co-operated with Dr. Millman in his meteor programmes, as described in Dr. Millman's letter.

4. *Nova search* and *Comet search.* This world-wide programme is carried on by the AAVSO in co-operation with the British Astronomical Association.

It is of course mainly negative, and hence not often spectacular. Topham, with his knowledge of the sky, is an alert and systematic contributor to this work. He has spent considerable time looking for comets and novae.

B. Instrument Construction

Mr. Topham is very interested in instruments and their construction. Recently he has taken up mirror grinding and polishing, and has not only made a six-inch, and has started on an eight-inch, but has been generous with his time helping other amateur telescope makers to obtain materials and get started. He has bought and reconditioned various instruments, including a sextant, spectroscope, and cameras which he uses observationally and in demonstrations to visitors. The dome of his own observatory is of his own design and construction, and is very light, cheap, and serviceable. It is driven electrically by an ingenious method of his own manufacture.

C. Popularization of Astronomy

Though Mr. Topham is almost totally deaf as a result of a shell explosion during his service overseas in 1916, he overcomes this handicap in a remarkable way in dealing with the astronomical public. With no advertising or publicity, merely by word-of-mouth rumour, his observatory has become very noted in the city as a place where amateurs are welcome. He has large numbers of visitors to whom he shows objects through his telescope, and whom he instructs in the elements of astronomy. While he does not keep a record of all his visitors, an estimate based on the fraction who do sign his book indicates that he probably has had three thousand visitors during the past few years. He tries to limit his visitors to moonlit nights which are less suitable for research work.

Mr. Topham has made one further interesting contribution to the Society. He secured and presented to me an old document which Dr. Chant and I have discovered to be the original draft of the constitution of our Society, written by Mr. Robert Ridgeway in 1868.*

(The letters mentioned above which were attached to the application are not printed.)

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*A photograph of this document appears in Plate VI. About 1930 Mr. Topham, in answering an advertisement in a Toronto newspaper, went to the village of Whitevale, twenty miles away, to examine a three-inch telescope offered for sale. He purchased it and among the papers along with it in its case was a sheet of blue foolscap paper. As a curiosity it was pasted on the wall of Mr. Topham's observatory and it was brought to the attention of Dr. Hogg when on a visit to the observatory. The three-inch telescope had belonged to Mr. Ridgeway and was sold by his daughter Mrs. A. J. O'Malley who has since then moved back to Toronto. Mr. Ridgeway was a teacher in the Collegiate Institute on Jarvis Street and later a Customs House employee. He was editor of *The Canadian Magazine*, a very presentable magazine, during its brief existence, July 1871-January 1872. A biographical sketch is given in this Journal, vol. 11, p. 51-61, 1917. Mr. Ridgeway died April 25, 1912, aged 89 years—*Editor.*

I have pleasure in introducing Mr. Bertram J. Topham, the first recipient of the Chant Medal.

REPLY BY MR. TOPHAM

Ladies and Gentlemen, I wish to thank the President and the Council of the Society, for the first award of the Chant Medal. The pleasure I get from following a steady programme was all I thought of—without dreaming of any medal. I know there are other amateurs who are following a steady programme in their chosen section and I hope they will keep on and also get a Chant Medal.

I can see where competition is going to be very keen, and, as our late general of the last war said to us after a victory, "We cannot live *on* our honours, we must live *up* to them," so I am going to give keen competition. I thought that I needed mathematics before I could take up astronomy, but I do not know anything but ordinary arithmetic and find I only need to know how to add and subtract in order to find the position of any object I look for.

When standing in the trenches in the last war I got to noticing how the starry heavens revolved round during the night and noticed that one bright star (I knew nothing about planets, etc., then) seemed to move past the smaller ones. Week by week I watched it and noticed that in time it got close to another fairly bright star and I decided to watch what they would do when nearest. Here I noticed that the fairly bright one also was moving through the smaller stars. Later the bright one passed the other one and still later it came back again and then they got farther apart and in time passed off the sky. I watched for the bright one until I saw it next winter and in time I got to knowing where I would see it.

When I returned to Toronto after the war, I decided I would find out some place where I could get to know something about these stars, their motions, etc., and eventually got hold of a star book—it was a HANDBOOK of the Royal Astronomical Society, which was printed right here in Toronto and the Society was in Toronto. I studied it and came to the conclusion it must be Jupiter, a planet, I was always noticing roaming round the sky.

I had lots of evenings in which I did not know how to pass the time away. We had an old 1½-inch telescope and I thought I would

watch for the old star I used to see, and when I found it I rested the telescope on the fence and what a thrill I got! The star was Jupiter and I could see four other stars, but not the same as the ordinary stars —these were all in one line. So I looked to see what this HANDBOOK had to say about it and found they were four bright moons of Jupiter, and also that at all hours of the night they were altering their positions and at times some one or two of them would be hidden behind the planet and at others come in view again. Now I got a friend to go to the address on College St. where this HANDBOOK was sent out from (I would not go myself, I guessed they would all be "brass hats" as we called the generals in those days as they wore gold braid on their hats) and get me a HANDBOOK of that year. It was only 25c. and I noticed it listed the times these moons would go in and out, so I decided to watch these to see if I could find any listed wrong but though the book had them in ahead of the event they were there on time every time. I got real interested in these and had the people around look at them. I went to some of the meetings and was made a member (and knew nothing) and since have never had a dull minute. Matter of fact there are not enough hours in the day for me.

Now I want the other amateurs to get busy, I am going to do more now than ever, so look out some of you ladies who have amateur friends—they will be cancelling some dates on starry nights—except when it is full moon. I don't mean by that because of any romantic influence of the full moon but because observations go flat when there is a full moon. Then I go to the basement and do some mirror grinding, etc., so even at full moon and on cloudy nights there is a very interesting hobby for me to follow.

I thank you very much.

The chairman then informed the audience that the Council of the Society had authorized a replica of the medal to be made and suitably inscribed as a gift to Professor Chant, and he called on Mr. Andrew Thomson to make the presentation.

MR. THOMSON'S ADDRESS

Mr. Chairman, Members and Friends:

I am very pleased to-night to have been selected by the Council of

the Royal Astronomical Society of Canada to present to Professor Chant a replica of the Chant Medal.

This silver replica was prepared by the Lackie Co. of Toronto and has the same design embossed on its surfaces as the medal which has just been awarded this evening. The following words are inscribed on the replica: "A facsimile presented to Dr. Chant by the Royal Astronomical Society of Canada," followed by the year "1941". Plate VII.

It is a rather interesting co-incidence that the very earliest published article of Professor Chant's that I have been able to unearth was a strong and straight-from-the-shoulder article on the subject of medals which appeared in the *Toronto Mail*, January 25th, 1891. I feel that everyone at this meeting has read some of Professor Chant's writings with both pleasure and profit. We may have been charmed with his *Our Wonderful Universe*, now available in its second edition, or his articles either in our own JOURNAL or in the daily press. Let me assure you, however, that his very first appearance in the public press discussing the subject of medals had, I believe, as much vigour and vim as anything that he has published in the past fifty years.

In those far off and distant days it would appear that there was strife within the hallowed walls of this great University. The College Council had decreed that a medal should be presented to the graduate standing highest in the Physics Course but the Senate who held the examinations through its spokesman, the registrar, reported that "it was practically impossible to discover the best man". Despite the human interest in Professor Chant's letter to the *Mail*, I am only going to read to you a few lines at the beginning and at the end.

To the Editor of the *Mail*:—

In your issue of the 3rd of October last appeared a short letter from "Enquirer" asking some one to explain why, on the occasion of Convocation two days before, the University authorities did not award a medal in the Department of Physics. No one answered these most reasonable requests, and though it may seem rather late now I hope to give a little information on the question, being very certain that a great injustice was committed.

(Then follows a lengthy analysis of the evidence which had been gathered in an attempt to determine who was responsible for an evident injustice. The last paragraph of the letter is quoted herewith.)

On considering the whole facts as I have received them I can only suppose that there must be personal friction among the authorities. If personal matters are allowed to influence the Council's proceedings, the medals had better be abolished at once.

C. A. CHANT.

Now let me say to all present and to Professor Chant in particular, that personal matters have influenced the Council in presenting him with this replica to-night. Each of us feels a debt of gratitude to him—many of us, the personal debt of students to an old teacher; others, as a friend and adviser in our hobby. Certainly this Society as an organization has a tremendous debt to him for having, in no small measure, skilfully and wisely guided its course for over forty years.

Perhaps Professor Chant in the year 1941 will forgive the University Senate of 1891 for not giving a medal. The Senate of half a century ago had a reason that seems to me unique in University history—there were too many good men in the class all exactly equal. True it is there were giants in attendance at the University in those days. Among others, Professor DeLury, who is present with us to-night, the late Sir John McLennan and Professor Gordon Hull to mention only a few names well known in science.

At any rate, I hope Professor Chant will accept this replica knowing that it is given to him as a purely personal matter to indicate the appreciation, respect and gratitude of every member of the Royal Astronomical Society of Canada.

PROFESSOR CHANT'S REPLY

Mr. Chairman and Friends:

I hardly know what to say but certainly my first words must be to thank Mr. Thomson for his kind remarks. Then I must express my appreciation of the Council's thoughtfulness and generosity in founding a medal bearing my name and in presenting me with a facsimile of it. They surely sensed that nothing would please me better.

I was greatly surprised to hear Mr. Thomson refer to an incident which happened half a century ago and which I had long since dismissed from my memory. In brief explanation I may say that a peculiar injustice had been committed and as a final court of appeal I wrote to the newspaper. I expressed my views as clearly as I could

and signed the letter. The trouble arose from conflicting regulations and the persons responsible for the injustice adopted the old method of "passing the buck". My letter prevented any further similar errors.

There is another matter that interests me. Being a past-president, I am a member of the Council, and yet the establishing of the medal was all settled before I learned that such a thing was "in the wind." Of course I was down in Florida enjoying the sunshine for a part of the time, but I suspect that a couple of my friends conspired to prevent any knowledge of what was being done from reaching me. Well it all came as a pleasant surprise and I forgive them.

I note that the words on the medal refer to my "Lifetime services to Astronomy." Of course there is some truth in that phrase, but I can say that I have always felt happy in this work, without any thought of future recognition. Mr. Topham has expressed that idea in his lively remarks upon receiving the first award of the Chant Medal, and many more in this audience, from their experience can echo the sentiment that the cultivation of Astronomy, like virtue, is its own reward.

This copy of the Chant Medal will always be cherished as one of the most valued of my souvenirs.

It has been usual at the annual At-Home for the president of the past year to review the year's accomplishments in astronomy or to give a paper on some other subject in which he is specially interested. Dr. J. A. Pearce, of Victoria, B.C., the retiring president, intended to present a paper on a historical subject, but a few days before the date of the meeting he telegraphed that through illness he would not be able to have it ready. Dr. Hogg stated that in order to complete the programme he had asked Professor C. A. Chant to relate some of his experiences, which reach back many years, and he had consented to do so. He had pleasure in calling on Dr. Chant who would speak on

Recollections of Astronomy in Canada

Among the thinking people in any nation there is always a deep and abiding interest in astronomy. This fact is well illustrated in our country by the observations made of the transit of Venus in 1882. Quite recently, namely on November 11, 1940, there was a transit of

Mercury, which was satisfactorily observed at Victoria, B.C., although rain and snow hid the sun at the critical time in every other province. But a transit of Venus is a much rarer phenomenon. Sixty years ago it was believed that it provided perhaps the best method of determining the distance of the earth from the sun, which is the astronomer's most important measuring rod.

As you all know, the more technical publications which are received by the Royal Astronomical Society of Canada are passed along to the David Dunlap Observatory where they are classified and catalogued and thus made available to the Observatory staff, the Society's members and indeed to the public. The Meteorological Office also transfers to the Observatory any material which it cannot utilize and which will probably be of value to the Observatory. In this way a few months ago there came from the Office some bundles of the Dominion Government's Report on the last transit of Venus. The planet moved across the face of the sun between 9 a.m. and 2.30 p.m. (Toronto time) on December 6, 1882. I was then a student at the high school at Markham, and the headmaster, armed with smoked glass, tried persistently to see the much-talked-of phenomenon, but the sky over the village as well as over much of Ontario was cloudy all the time. However, at Kingston and Ottawa the second, third and fourth contacts were observed.

An interesting part of the Report is the description of the instruments which had been arranged to observe the transit. There were telescopes as follows: at Fredericton, with aperture 7-inch; Charlottetown, 4-inch; Halifax, 4-inch; Quebec, 8-inch; Montreal, 6¼-inch; Ottawa, 4-inch; Kingston, 6½-inch; Belleville, 4-inch; Cobourg, 4¼-inch; Whitby, 6-inch; Toronto, 6-inch; Woodstock, 8-inch; Winnipeg, 4-inch. Those at Quebec and Woodstock were the largest. The former was attached to the Meteorological station and had become rather famous for observations of sun-spots by Capt. E. D. Ashe; the latter was at the Baptist College. The 6-inch telescope at Toronto had been imported from England expressly for these observations and was mounted on the stone tower of the Meteorological Observatory. It is still on the University grounds in the same tower moved to another position, the original location being marked by a bronze plate.

The instrumental equipment as well as the men qualified to handle it were in the country although on this particular occasion the results obtained in this, as in various parts of the world, were disappointing.

The federation of the provinces into the Dominion of Canada became effective on July 1, 1867. It included then only Ontario, Quebec and the three maritime provinces, but it was confidently expected that it would soon extend from the Atlantic to the Pacific Ocean. In 1868 the British Parliament passed the Rupert's Land Act by which the immense holdings of the Hudson's Bay Co., granted by King Charles II in 1670, were to be transferred to the new Dominion in return for £300,000 and certain grants of land. These conditions were approved by the Dominion Parliament and on December 1, 1869, Canada came into possession of the almost boundless acres of the northwest. It has been computed that the actual cost of the land thus obtained was about one-sixth of a cent per acre.

Now before a tract of land can be thrown open for settlement it must be surveyed. The Dominion Lands Office of the Department of the Interior was organized and of this there was an Astronomical Branch. Many able men were employed in it, one of the most outstanding being W. F. King. At the age of 21 in 1875 he obtained his B.A. degree from the University of Toronto, but a year earlier he had been given a position of responsibility on the International Boundary Commission. He was a very quiet unassuming man—indeed I heard a highly-placed fellow civil servant describe him as almost inanimate—but his superior ability and his unerring judgment simply led to his promotion to the highest position in these surveys.

When the area to be surveyed is small, like a township, it may be treated as a plane and the proceeding is comparatively simple. But when the dimensions are measured in hundreds of miles the curvature of the earth must be taken into account, and the astronomer must lend his assistance in determining the meridians and the parallels of latitude. There was difficulty also in adjusting the boundaries of the townships so that they should all be equal and the lots into which they were subdivided be all of the same size, each a square mile.

The survey made progress and in a few years there was a great migration from the eastern provinces to the fertile lands of the west.

When I was a lad there was scarcely a farm in the old-settled communities from which some young men had not gone to create new homes and towns and cities in the North-West Territories.

By about 1890 the fundamental lines of the surveys extended over the entire country. But there was still much to do, of a very refined nature, in delimiting provincial and international boundaries and in uniting the entire Dominion in a precise geodetic survey. The basis of all this work is the accurate determination of positions, including differences of level, by astronomical observations. The starting-point was Ottawa. Comparatively modest-looking instruments housed in very unpretentious buildings had served up to this time, but it was now felt that there should be a more permanent home for the equipment and for the staff which would be required to carry on the work.

So Dr. King urged the construction of an astronomical observatory, with the required facilities, and in 1899 the sum of $16,000 was voted for a building to contain accommodation for clocks, chronometers, transit instrument, as well as a 10-inch telescope for public use. Its location was expected to be convenient to the government buildings. Then it was realized that this was to be a government observatory and the amount named evidently was not sufficient to provide an appropriate building and equipment worthy of it. So new plans were drawn and in 1901 the sum of $30,000 was voted for a 15-inch telescope and a handsome building to house it and provide offices for the staff. The contract was let in 1902 and the building was occupied in April, 1905.

Now let us go back a few years. In the autumn of 1889 John S. Plaskett came to the University of Toronto to become lecture assistant and mechanical assistant in the Department of Physics. Up till then there had been a handy-man who kept the apparatus clean and helped in the demonstrations in the lectures. I may remark that at that time I was in my final year in the arts course and the entire staff in the Arts Faculty was hardly as numerous as the present staff of the Department of Physics. The new appointee was a skilled machinist and a master of the electrician's art which was then rising into prominence. About the first job he undertook in his new workshop was the design and construction of a suitable dynamo to supply current to the electric arc projection lamp. This was to avoid setting up a large

battery of Grove cells whenever the lantern was to be used—a time-consuming, expensive and messy business. The dynamo was driven by an "Otto" gas-engine which was the source of power for the workshop. I graduated in 1890 and, after a year in the Civil Service in Ottawa, returned to the University on a sessional appointment beginning October 1, 1891, and a year later was placed on the permanent staff in the Department of Physics. Mr. Plaskett mixed freely with the members of the staff and with the students in the well-known "M. and P." (Mathematics and Physics) honour course, and in a few years formed the ambition to take this course himself. First he obtained matriculation and then, studying in his spare time, he took one examination after another, and in 1899 graduated B.A. with first class honours. It was hoped he might become a junior member of the faculty but a year or two later when the observatory at Ottawa was being constructed he was appointed Mechanical Superintendent, his chief duties being to give advice on the equipment and see that it was installed properly.

On August 30, 1905, there was an eclipse of the sun and the early portion of its path of totality passed over Labrador. A request to the Dominion Government that an expedition be sent to observe it was favourably entertained and Dr. King was placed in charge. The R.A.S.C. had supported the proposal and was given generous representation on the expedition. Mr. Plaskett was asked to prepare the equipment which the Observatory would use and to look after its installation at North West River, some 120 miles from the Atlantic coast. This was a complicated and difficult undertaking but it was performed in a capable manner. The sky was cloudy at the time of totality and the members of the expedition were greatly disappointed, especially Mr. Plaskett, who had laboured so hard. But he had had his chance and had shown clearly what he could do, and soon after the return to Ottawa he was promoted to be Astronomer and put in charge of the astrophysical division of the Observatory. I may say that there were already able men in charge of the other divisions, but the astrophysical section was quite new. A number of new appointments were made to the astrophysical branch, including W. E. Harper, and the published researches soon brought distinction to the Observatory and to Canada.

After a number of years it was found that the 15-inch refractor was hardly powerful enough to continue effectively its use for stellar spectroscopy, and furthermore large reflectors were then coming into prominence. The Government was urged to provide a much larger instrument and in 1913 permission was given to order a reflecting telescope with a mirror 72 inches in diameter. This was considerably larger than any in operation. The glass disc for the mirror was shipped from Belgium just a few days before the outbreak of the first great war, and the completed telescope, erected near Victoria, B.C., did not begin observing until the war was just closing. At first Dr. Plaskett was assisted by Dr. R. K. Young in handling the great telescope but they were soon joined by Mr. Harper. There have been many investigations of the highest importance made at this observatory, which has been acclaimed one of the world's greatest.

Before I close I must refer to the growth of the interest in astronomy at Toronto and beyond. Considerable credit should be given to our Astronomical Society. It was in December, 1892, that I joined it, when its name was the Astronomical and Physical Society of Toronto. To me the most interesting feature of the meetings was the living interest in the subject shown by some of the members. When asked about any of the planets or a visiting comet or the chief stars they usually could give the information without hesitation. I had never taken a formal course in astronomy and I lacked an intimate familiarity with the heavens. Professor A. T. DeLury, of the Department of Mathematics, one of my classmates at the University, took an active interest in the Society and gave several sets of lectures which were well attended.

At the University there was always some instruction in astronomy —usually an elementary and a more advanced course. For a good many years practically no attention was given to the physical side; indeed the text-books on astronomy forty years ago dismissed it with a very brief treatment. But the spectroscope and the photometer were becoming continually more important in astronomical investigations and as I professed to be a physicist that aspect of the subject appealed strongly to me.

As the years passed, the small amount of attention given to astronomy in the University and the meagreness of its astronomical

equipment became more and more evident. The University was growing rapidly in other fields and I was axious to see expansion and modernization in astronomy. When I became president of the Society I tried to link it to the University in a way advantageous to both sides, but no suitable formula could be found to unite them. However, I discussed with my colleagues in Mathematics and Physics the proposal to widen the instruction in the University and received cordial encouragement. In carrying out this proposal it was agreed to have a sub-division in the final year of the course in Mathematics and Physics designated Astronomy and Physics. To stimulate interest in this branch the R.A.S.C. offered a gold medal to the candidate who should stand first in first-class honours in Astronomy and Physics. The first award was made in June, 1906, to W. E. Harper who was appointed immediately to the Dominion Observatory at Ottawa. I have mentioned his name already. He passed away last June, leaving behind him a distinguished record as a professional astronomer. A long series of succeeding medallists have brought great credit to the University and the Society.

When in Labrador in 1905, it would appear, I contracted the "eclipse fever", which, however, disappeared and was dormant for thirteen years. On July 18, 1918, there was an eclipse of the sun for which the path of totality extended diagonally across the United States from the state of Washington to Florida, and I had the pleasure of photographing the eclipsed sun with modest equipment in Colorado. This made me keen to observe the next suitable eclipse, the time for which was in September, 1922, and the best place to see it was the northwest coast of Australia. At this time the Einstein effect was being discussed everywhere and the demand for evidence in support of the theory or against it led astronomers to concentrate upon that problem. On that occasion it was my great good fortune to be accompanied by two of my family and to have Dr. R. K. Young as my assistant. The expedition was full of wonderful, almost "fairyland", experiences, but it was of especial importance to me in that it led to the removal of Dr. Young from Victoria to join the Department of Astronomy at the University of Toronto. The Australian trip was also of value in arousing interest in the project of securing better

facilities at Toronto for astronomical teaching and research which I had been advocating throughout the country for years.

I need not give the very personal details of the steps which culminated in the dedication of the David Dunlap Observatory in 1935. They are already on record. I shall only say that it was in this very room, after a lecture during which I had appealed for support for a great observatory, that Mr. David Dunlap made himself known to me. I felt sure he would establish the observatory, but he passed away; and a few years later his widow erected it as a memorial to him. It is one of the noblest memorials in the world. During the five years it has been in operation its results have been recognized all over the world as of the highest quality. Its great telescope has been able to do what it was planned for. In recent months, to our regret, the work has proceeded under difficulties. First, two of the young men holding yearly appointments to the staff left to enter directly into war service. More recently two of the permanent staff, Dr. Heard and Dr. Millman, withdrew to become instructors in the air force. Further, Dr. Young and Dr. Hogg, the senior members of the staff, are giving to the Government scientific services of the highest value in addition to carrying on the work of instruction at the University and the labour of observing at the Observatory. Certainly the Observatory is doing its duty in our fight for freedom!

Professor D. S. Ainslie, of the Department of Physics of the University and an officer of the Society, had prepared a large number of experiments to illustrate radiation of various kinds—chiefly electrical—and the apparatus was spread over the long lecture table of Room 42 where the meeting was held. First, he explained the nature of radiations he wished to exhibit and then he performed many striking experiments. The audience was highly pleased with Dr. Ainslie's entertainment.

After this exhibition adjournment was made to the Library of the Department of Physics upstairs, where a pleasant social hour was spent.

MINUTES OF THE ANNUAL MEETING OF THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

The annual general meeting was held in the McLennan Laboratory, University of Toronto, at 8.00 p.m., on Tuesday, January 14, 1941. The Vice-President, Dr. Frank S. Hogg, was in the chair.

On motion of Mr. F. L. Troyer, who was appointed recording secretary *pro tem*, seconded by Dr. D. W. Best, the minutes of the annual general meeting of January 16, 1940, were approved and adopted as printed in the JOURNAL for March, 1940.

Mr. J. H. Horning, General Treasurer, in his report pointed to the increased expense of publications, due in part to the costs of paper and printing, and also to the larger print order for the OBSERVER'S HANDBOOK, and the special jubilee number of the JOURNAL published in September, 1940. Many copies of the HANDBOOK had been distributed without charge for instructional use in the Royal Canadian Air Force and other services, he said. Moved by Mr. Horning, seconded by Mr. E. J. A. Kennedy, that the treasurer's report be adopted and published in detail in the JOURNAL. (Carried.)

Mr. Andrew Thomson presented the auditors' report on behalf of himself and Mr. F. L. Harvey. A suggestion that a detailed comparison of receipts and expenditures over the past three years be published with the annual report in the JOURNAL was approved by the meeting. The auditors' report was accepted.

Moved by Mr. Horning, seconded by Dr. D. W. Best, that Mr. Thomson and Mr. Harvey be asked to act as auditors for 1941. (Carried.)

Mr. E. J. A. Kennedy in presenting his report as General Secretary referred to plans for commemorating the fiftieth anniversary of the Society's incorporation in 1890 which had to be abandoned because of the war. The establishment of the Chant medal for outstanding contributions to astronomy by Canadian amateurs, the visit of the American Association of Variable Star Observers to Toronto as guests of the Society, the loss of an unusually large number of past presidents and prominent members by death, and the Society's membership were outlined in his report. Moved by Mr. Horning, seconded

by Mr. J. R. Collins, that the report be accepted and published in the JOURNAL. (Carried.)

The report of Dr. P. M. Millman, Librarian, was read by Miss E. M. Budd, assistant secretary. Moved by Mr. Horning, seconded by Dr. Best, that the report be accepted and printed with the annual report. (Carried.)

Mr. R. S. Duncan, Curator, in his report pointed out that all the usable telescopes belonging to the Society were out on loan, but that there had been practically no demands on the lantern slide collection. Moved by Mr. Troyer, seconded by Mr. T. H. Mason, that the report be adopted. (Carried.)

On motion of Mr. Kennedy, seconded by Mr. Horning, a special committee consisting of Mr. Duncan, Dr. Best, Mr. Collins and Miss Ruth Northcott was formed to examine the lantern slide library and to report to the next meeting of the general council on the cost and methods of bringing the collection up-to-date and for making the slides of greater use to members and other interested persons. (Carried.)

The scrutineers, Mr. Duncan and Miss Budd, then reported that the 184 ballots returned were almost unanimously in favour of the slate printed on the ballot. Dr. Hogg then declared officers for 1941 elected as follows:

Honorary President—The Hon. Duncan McArthur, Ph.D., Minister of Education for the Province of Ontario.

President—F. S. Hogg, Ph.D., Toronto.

First Vice-President—Miss A. Vibert Douglas, Ph.D., Kingston.

Second Vice-President—D. S. Ainslie, M.A., Ph.D., Toronto.

General Secretary—E. J. A. Kennedy, Toronto.

General Treasurer—J. H. Horning, M.A., Toronto.

Recorder—R. H. Combs, Toronto.

Librarian—P. M. Millman, Ph.D., Toronto.

Curator—R. S. Duncan, Toronto.

Council—S. C. Brown, Toronto; H. Boyd Brydon, Victoria; J. W. Campbell, M.A., Ph.D., Edmonton; Rev. W. G. Colgrove, London; Dean Henry F. Hall, Montreal; E. A. Hodgson, M.A., Ph.D., Ottawa; A. E. Johns, Ph.D., Hamilton; A. R. McCauley,

Vancouver; Andrew Thomson, M.A., Toronto; L. A. H. Warren, M.A., Ph.D., Winnipeg.

The proposed amendment to Article V of the Constitution, approved by the General Council at their meeting of November 5, 1940, as follows:

> "Owing to the increasing number of Centres, and the desire to have more widespread representation of the Centres on the Council, the number of elective members of Council be increased from 10 to 12,"

was passed, 182 ballots in favour, two against.

On motion of Mr. Kennedy, seconded by Mr. Collins, appreciation of the services of Dr. Chant, Dr. Hogg and the editorial committee was expressed.

A vote of thanks for the work of the Officers and Council through the year was moved by Mr. Troyer, seconded by Mr. Mason, and passed unanimously.

FREDERIC L. TROYER, *Acting Recording Secretary.*

GENERAL SECRETARY'S REPORT FOR 1940

The year 1940 was an eventful one in the history of the Royal Astronomical Society of Canada. It marked the fiftieth anniversary of its founding. Although for many years previously interested individuals had held astronomical meetings the incorporation of the Society was effected in 1890. To celebrate suitably this Jubilee the Council had, during 1939, discussed plans and appointed a committee who had prepared an ambitious programme, including a series of gatherings to be held in Toronto to which members and friends from across Canada were to be invited. The war intervening, the Council felt obliged to abandon the committee's plans, and approved the proposal to make one of the issues of the JOURNAL a Jubilee Number devoted principally to a recital of the history of the Royal Astronomical Society and the early events leading to its organization. Dr. C. A. Chant was chosen to write this history. His intimate association with the founders of the society, including Elvins, Miller, Lumsden and others and his own long membership, dating back to 1892, made the Council's choice a suitable one. It is interesting to note that this history shows that the only surviving charter members

are A. F. Miller of Toronto, and David J. Howell of Devonshire, England.

The establishment of the Chant Medal is now an accomplished fact. This medal, founded with the assistance of the Southam Press Fund, fulfils a two-fold purpose: first, perpetual reminder of Dr. Chant's service to the Society and the science of astronomy in general; and second, the stimulation of effort and interest on the part of amateur astronomers. The committee appointed to adjudicate the formal nominations received have announced that Bertram J. Topham is the first winner of this award. The members of the committee are given below.

No year has shown greater losses to the Society through the visits of the Grim Reaper than this one. Three Past Presidents, and a Past President of the Toronto Centre have passed away; also Ottawa Centre reports the death of R. M. Motherwell, C. C. Smith and J. B. Cannon. Dr. W. E. Harper, Director of the Dominion Astrophysical Observatory, died on June 4, A. R. Hassard on June 26, Sir Frederic Stupart on September 27 and A. F. Hunter on October 19. Their achievements are well known to the members, and have been recorded in the JOURNAL, the influence of their personalities will long be felt and "their works do follow them."

The visit of the A.A.V.S.O. was a high spot in the annals of the Toronto Centre. This event was the occasion of the Association's annual Spring Meeting, and some 40 visitors from all parts of the United States attended. The many meetings and social times spent together during the two days, including a reception by Mrs. Dunlap at Don-Alda Farm, cemented many old friendships, and made new ones. The report of the Secretary, Mr. Leon Campbell of Cambridge, Mass., indicated that it was a most successful meeting from the standpoint of the A.A.V.S.O. Certainly the R.A.S.C. gained a great deal from the visit.

A statement of the membership follows:

MEMBERSHIP ON DECEMBER 30, 1940

	1939	1940
Toronto Centre	188	188
Ottawa "	58	60

Victoria "	114	107
Montreal "	115	91
Winnipeg "	38	45
London "	47	47
Edmonton "	43	45
Hamilton "	54	54
Vancouver "	32	38
Members at Large	213	228
Life Members not in Centres	12	15
	914	918
Additional Subscribers to JOURNAL	78	60

This shows an increase of 4, but again we have to point out that the number of Members at Large is steadily increasing each year, and this makes up for any decreases in the Centres.

The demand for our publications and reprints is increasing steadily; about 400 more copies of the HANDBOOK were sold in 1940 than in 1939.

The reports of the Centres continue to indicate a sustained interest in the subject of astronomy, judging by the number of meetings held, and the reports of observations. London, as you will notice, reports large public attendances at outdoor observations, also the opening of the new Hume Cronyn Observatory, which ought not only to help the London Centre but also the Society generally. Victoria apparently finds their summer courses a success.

As the membership increases the Council of the Society has concerned itself with the thought of stimulating increased effort in observation and research among the purely amateur members, and so in this jubilee year just ended the Chant Medal was established. The award of this medal is to be based on the value of the work of the candidate to the science of astronomy or closely allied fields of original investigation. The method of procedure in choosing the recipient is to ask for nominations from all parts of Canada with the work detailed by the nominator on special forms provided for the purpose. The committee of judges named by the Council consists of the following outstanding Canadian astronomers:

Prof. H. R. Kingston, Western University, London, Ont.
Dr. J. A. Pearce, Head Astronomer,
Dominion Astrophysical Observatory, Victoria, B.C.
R. M. Stewart, M.A., Dominion Astronomer, Ottawa.
Dr. R. K. Young, Director, David Dunlap Observatory,
Richmond Hill, Ont.

E. J. A. KENNEDY, *General Secretary.*

REPORT OF THE LIBRARIAN

During 1940 the following periodicals were received:

From Canada and the Empire	87
" The United States	183
" Other Countries	73
Total	343

Also the Harvard Announcement Cards and 26 maps of the series Catalogue Photographique, from Toulouse, France.

Books loaned from the shelves during the year, 161.
Expenditure on binding and new books, $151.62.

The following were added to the library by purchase:

"Astronomy", by W. F. Skilling and R. S. Richardson.
"Stars and Men", by S. A. and M. L. Ionides.
"New Pathways in Science", by A. S. Eddington.
"Astronomy", by R. H. Baker, 3rd Edition.
"The Star Gazer", by Isolt von Harsanyi.
"The Romance of the Calendar", by P. W. Wilson.
"The Universe Unfolding", by R. H. Baker.
"A Beginner's Star-Book", by Kelvin McKready, 4th Edition.
"Astronomy for the Layman", by Frank Reh.
"Comets", by Mary Proctor and A. C. D. Crommelin.
"The Sun", by Giorgio Abetti.
"The Masses of the Stars", by H. N. Russell and C. Moore.
"Eclipses of the Sun and Moon", by Sir Frank Dyson.
"Life on other Worlds", by H. Spencer Jones.
"Our Wonderful Universe", by C. A. Chant, new revised edition.
"Spectra of long-period Variable Stars", by Paul W. Merrill.

P. M. MILLMAN, *Librarian.*

REPORTS OF THE SECRETARIES OF THE CENTRES

Toronto Centre

The lectures during the year were unusually well attended. This can be attributed not only to the popularity of the speakers themselves, but also to the interesting subjects which they chose to lecture upon. There were eleven evenings devoted to the following lectures: "A Race to the South Pole" by J. R. Gibbs, M.R.A.S.; "Planets to the West of Us" by Miss R. J. Northcott, M.A.; "What Time Is It?" by Professor J. O. Wilhelm; "A Geologist Looks at Meteorites" by Professor G. H. Reavely; "Astronomical Reading and the Amateur" by Miss E. M. Fuller, B.L.S.; "The Cultural Geography of Central Europe" by Professor Griffith Taylor; "Mirror Making for the Amateur" by S. C. Brown; "Recent News About Meteors" by P. M. Millman, Ph.D.; "Thunder and Lightning" by J. R. Gibbs, F.R.M.S.; "Mercury, Past and Present" by Miss R. J. Northcott, M.A.; "The Schmidt Camera" by Professor R. K. Young, Ph.D.; "The Question of Life on Other Worlds" by P. M. Millman, Ph.D.; and "Experiments With Short Radio Waves" by Professor A. Pitt, B.A.

Of great interest to the Toronto Centre this year was the visit of the American Association of Variable Star Observers who accepted our invitation to hold their Annual Spring Meeting at Toronto. We were also justly proud to have one of our members, Dr. Helen S. Hogg, elected President of this organization. The Society is deeply indebted to Professor R. K. Young and the staff of the David Dunlap Observatory for their willing co-operation and untiring efforts to make the visit a pleasant and memorable one. The Officers and Members of the Toronto Centre also extend to Mrs. David Dunlap our most sincere appreciation for her graciousness in entertaining the members and friends of the A.A.V.S.O. at Don-Alda Farms.

Short lecture studies at the end of each meeting were again carried out this year with Professor F. S. Hogg instructing, and are becoming one of the most popular parts of the evening.

There are 188 members on the roll, 9 of whom are Life Members. During the year, we lost 8 members and gained 8. It is with the deepest regret that we record the passing, during the year, of four of our most prominent members: The Hon. L. J. Simpson, M.D.,

Honorary President of the Society; Sir Frederic Stupart, a Past President; Mr. A. F. Hunter, M.A., also a Past President; and Mr. A. R. Hassard, K.C., Past Chairman of the Toronto Centre.

F. L. HARVEY, *Secretary.*

OTTAWA CENTRE

Meetings. There were three open meetings and one for members and friends only of the Ottawa Centre as follows:

January 19—"Stars and Clocks" by the late C. C. Smith, former chief of the Time Service of the Dominion Observatory. This meeting was held in Rockliffe Park at the invitation of the Rockliffe Park Public School Board. Three telescopes were set up after the indoor session.

February 15—"Meteors" by M. M. Thomson, of the Dominion Observatory. This was a joint meeting with the Ottawa Field Naturalist Club, held in St. Patrick's College, and again the indoor session was followed by outdoor observations with three telescopes.

March 2—An outdoor meeting at the Observatory for the purpose of viewing the five planets. Cloudy weather intervened. There was no formal gathering of the members.

November 26—The members and their friends were guests of the Dominion Astronomer at an evening meeting at the Observatory. All divisions of the Observatory were on display, and in addition there was an interesting showing of amateur work. Refreshments were served.

In addition there were two Council meetings.

Membership. At the beginning of the year, the membership stood at 58. One member was lost by death, while three new members joined, making our total at the end of the year 60.

Observations. Meteor observations both visual and photographic, were carried out at the Dominion Observatory and at Old Stittsville during the Perseid shower of August. Plans for the Leonids in November were defeated by reason of cloudy weather. In this programme five members and fifteen non-members, most of whom were high school people, participated. Auroral observations have been continued by two members.

Amateur Telescope-Making is being continued by at least three members. In addition an ingenious planetarium and other devices of interest have been made by other members.

Correspondence. The usual notices to members concerning meet-

ings, etc., have been sent out. One News Letter concerning the "Parade of the Planets" and accompanied by a picture of their positions was mailed to the membership. Sky-Facts, a weekly column in the local Southam Press paper, the "Citizen", was commenced and has proven a worth while venture.

As in the past, and through the courtesy of the Dominion Astronomer, the Saturday Evening Programme Bulletin of the Dominion Observatory, was sent to all members. New observatory star charts have also been made available upon request.

MALCOLM M. THOMSON, *Secretary.*

HAMILTON CENTRE

This Centre held eight regular meetings during the year and a field night meet as well.

January 4—Prof. A. E. Johns: Consequences of the earth's rotation.
February 1—W. S. Mallory, M.A.: Consequences of the earth's revolution.
March 7—Dr. W. H. McNairn, Ph.D.: Is the universe running down?
April 4—Dr. Helen Sawyer Hogg, A.B., Ph.D.: Variable stars and the amateur's contribution to astronomy.
May 2—Geo. E. Campbell, M.A.: Some paradoxes in astronomy.
September 7—Field night at the residence of W. T. Goddard.
October 3—In three parts, Practices and uses of astronomy by Dr. A. E. Johns; Observational part of astronomy by T. H. Wingham, B.A.Sc.; Historical astronomy by F. H. Butcher and W. D. Stewart.
Refreshments were supplied by the wives of the executive at this meeting.
November 7—Dr. Wm Findlay: Sunrise and Sunset.
December 5—F. H. Butcher, B.A.: Derivation of some astronomical terms and an experiment in necromancy.

The meetings during the year were very interesting, due to the good management of the chairman, N. H. Broadhead, who introduced some inovations. The April meeting was in complete charge of the ladies of the Centre, including the reading of the minutes at the following meeting. All lectures except the annual meeting were preceded by a curtain raiser.

The enrolment of the Centre is now 54.

H. B. FOX, *Secretary.*

WINNIPEG CENTRE

During the year 1940 eight regular meetings were held as follows:

January 10—Exploring the Stratosphere: Prof. Harold F. Batho, University of Manitoba.

February 14—Aviation and Astronomy: C. H. (Punch) Dickins, General Superintendent, Canadian Airways.

March 13—Kepler, a Seventeenth Century Genius: Rev. Father Burke-Gaffney, St. Paul's College.

April 10—Members' Night: A study in Colour: Mr. W. P. Johnson; The Planetarium: Mr. V. C. Jones.

May 8—Mythology of the Constellations: Monsignor T. W. Morton, Honorary President.

October 9—The Splendour of the Heavens and What Our Great Telescopes Reveal: Mrs. E. L. Taylor, a Past President. Annual Social evening.

November 13—Colour and Architecture: Prof. Milton S. Osborne, University of Manitoba.

December 11—Mars Up-to-Date: Mr. L. J. Crocker, retiring president.

All meetings were held in Theatre F. University Buildings, except the Social Meeting in October, which was held in Rupert's Land Girls' School. The average attendance was thirty-five.

In addition one executive meeting was held in January at which a programme for the coming year was drawn up. During the year nine new members were elected; one member resigned and one membership was transferred to another Centre.

MARGARET E. WATTERSON, *Secretary.*

VICTORIA CENTRE

Membership. In January, 1940, the membership list contained 114 members: 2 life, 13 juniors, and 99 regular members. During the year 15 members were lost for the following reasons: 2 deceased, 4 resigned, 9 dropped for non-payment of dues. This policy of dropping members in arrears has been followed by the Council for several years past and will likely be continued since these persons are effectively a burden to the Society. During the year 1940, 8 new members, including one life member, were enrolled, so that the present membership stands at 107; these being divided as follows:

3 life members
8 junior members
96 regular members

107 total

It is estimated that a further decrease of 3 for non-payment of fees will be necessary. In actual numbers the membership has decreased during the past year, but it is felt by the Council that a smaller active and paid-up group is preferable to a larger inactive membership.

Meetings. During the year 20 meetings were held: 9 regular meetings, 5 Council meetings, 6 special summer course meetings. The success of the first dinner in December, 1938, warranted the function being made an annual affair, hence our first meeting of this year was the second annual Society dinner held in the Y.W.C.A. dining room, December 13, 1939. The usual high standard of lectures has prevailed; the policy of securing outside authorities was continued, so that lecture topics included not only astronomy, but also a wide range of other allied subjects. The Council meetings were held for the purpose of arranging programmes and carrying on the general business of the Society.

Summer Course. The summer course this year registered 31 members but the attendance at each of the 6 meetings averaged close to double that number. Victoria's usual fine weather seemed not inclined to favour the Society this year so that there was a minimum of actual outdoor observation. The quality of the lectures, the fine star maps and the interest in general discussion, more than compensated for this unavoidable loss.

One feature of great interest to both the regular and the summer course members was the visit to the Dominion Meteorological Observatory; this visit being made possible through the kindness of Mr. W. A. Thorne, who opened that institution to the Society the evening of August 19.

Radio Programmes. The weekly quarter-hour radio programmes were continued from January to April of this year and again in July, these latter being mainly to acquaint the public with the forthcoming summer course. It was felt by the Council that, for the autumn season at least, a continuance of the weekly radio programme would drain too severely the resources of the Society.

Lectures to the Forces. During the past autumn members of the Council have not been idle; under the sponsorship of the Y.M.C.A., Council members have given several lectures to the men of the three

forces. These lectures have proved extremely popular with the forces and will likely be continued in the new year.

PHOEBE RIDDLE, *Secretary.*

MONTREAL CENTRE

In common with all similar organizations the Montreal Centre, Royal Astronomical Society of Canada, has felt the results of the great struggle in which our country and the Empire are now engaged. However, it is firmly believed by the members of the Council that, unless, of course, such action interferes with the actual war effort of its members, the Society should, by all means, carry on.

Our programme during the past year has been a rather limited one. The summer observation meetings, perhaps the most interesting of our activities to many members, were discontinued altogether during the past summer owing to the apparent impossibility of securing a suitable location for our telescope.

During the year four very well attended general meetings of the Centre were held. At two of these meetings moving pictures on astronomical subjects were the feature of the programme and, at the others, the speakers were Dr. F. S. Hogg of the David Dunlap Observatory, Toronto, and Dr. Benjamin Boss of the Dudley Observatory, Albany, N.Y.

During the fiscal year eighty-nine members paid membership fees and two others paid direct to the General Treasurer in Toronto making a total of ninety-one paid-up members of our Centre for the year.

With regard to the Society as a whole we may note with justifiable pride that this year marks the fiftieth anniversary of the founding of the Royal Astronomical Society of Canada. It had been hoped to celebrate the occasion of this anniversary in a suitable manner by a large meeting in Toronto, which is the birthplace and headquarters of the Society. Because of the war this project was abandoned. However, the special Jubilee Number of the JOURNAL (September, 1940) will serve to remind members and others of the fiftieth anniversary of the incorporation of the Society. In this connection also one should mention the establishment of the Chant Medal to be awarded in recog-

nition of distinguished work by amateur astronomers and "in recognition of the long and outstanding services of Professor C. A. Chant." The details of this award are to be found also in the September, 1940, issue of the JOURNAL.

We note also with pleasure the election of Dr. A. V. Douglas, formerly Secretary-Treasurer of our Centre, and now of Queen's University, to the Second Vice-Presidency of the Society.

An event of interest to Canadian astronomers, both professional and amateur, is the construction of the Hume Cronyn Memorial Observatory of the University of Western Ontario at London, Ontario. This observatory is to be dedicated and opened tomorrow, October twenty-fifth, 1940.

Finally, it is with sincere regret and deep appreciation of their interest in the Royal Astronomical Society of Canada and the devoted service of their lives that we note the passing of two Canadian astronomers, Dr. W. E. Harper, of Victoria, B.C., and Mr. R. M. Motherwell of the Dominion Observatory at Ottawa. Their works live after them.

HENRY F. HALL, *Secretary-Treasurer.*

LONDON CENTRE

During the year 1940, the London Centre held nine regular monthly meetings with a total attendance of 209. In addition, two special public meetings were held on the roof of the Huron and Erie Building, with a total approximate attendance of three hundred people. A summary of these meetings follows:

January 12—Attendance 25.
- Out-door observations cancelled, due to cloudy skies.
- Handbook Study directed by Dr. H. R. Kingston.
- Demonstration "The Dissection of a Refracting Telescope" by Rev. W. G. Colgrove.

February 9—Attendance 16.
- Out-door observations cancelled, due to cloudy skies.
- Handbook Study directed by Dr. H. R. Kingston.
- Current Topics by Mr. E. H. McKone.
- Paper on Mercury prepared by Miss Livingstone.
- Construction of an Automatic Guide for Use with Star Maps by Dr. H. R. Kingston.

February 26—Attendance 200 (approximately).
Public observations from roof of Huron and Erie Building.
March 1—Attendance 100 (approximately).
Public observations from Huron and Erie Building. Splendid views of Mercury, Venus, Mars, Jupiter and Saturn were obtained.
March 8—Attendance 46.
Handbook Study directed by Dr. H. R. Kingston.
Current Topics by Mr. E. H. McKone.
Paper on Venus prepared by Mr. M. O. Culbert.
Lecture, "Spectroscopy and its Uses" by Mr. Gar Elson.
Movie Film on Finland.
April 12—Attendance 24.
Handbook Study directed by Dr. H. R. Kingston.
Current Topics by Mr. E. H. McKone.
Lecture "The Church and Science" by Rev. M. E. Conron.
May 10—Attendance 29.
Out-door observations cancelled, due to cloudy skies.
Current Topics by Mr. E. H. McKone.
Lecture, "The Solar System" by Rev. W. G. Colgrove.
June 8—Annual Picnic (in conjunction with a Regional Gathering of the Federation of Ontario Naturalists).
October 11—Attendance 20.
Out-door observations cancelled, due to cloudy skies.
Handbook Study directed by Dr. H. R. Kingston.
Paper on Saturn by Mr. O. Kilburn.
First observations of the London Centre through the new telescope of the Hume Cronyn Memorial Observatory.
November 8—Attendance 29.
Discussion of the Transit of Mercury (Nov. 11) by Dr. H. R. Kingston.
Lecture, "The Fourth Dimension" by Mr. Rogers J. Colgrove, B.A., B.Paed., Toronto.
Observations through the Cronyn Telescope.
December 13—Annual meeting. Attendance 20.
Reports of Secretary and Treasurer.
Election of Officers for 1941.
Paper on Jupiter (illustrated by models) by Mr. E. E. O'Connor.
Entertainment and Refreshments.

The paid-up membership at date December 13, 1940, is 37.

Mrs. E. H. McKone, a member of long standing, passed away in November.

The Meteor Observing Group, under the direction of Mr. J. Middlebrook, observed the Perseid Shower of last August. Only one clear night was available and the results were disappointing.

The year 1940 was outstanding in the history of the London Centre, inasmuch as it marked the opening of the Hume Cronyn Memorial Observatory. While this Observatory was a gift to the University of Western Ontario, the Cronyn Family has indicated that it is for the use of the London Centre of the Royal Astronomical Society and also for the use of the public. It is confidently expected that popular interest in astronomy will be greatly stimulated in London through the use of the new Observatory.

G. R. MAGEE, *Secretary-Treasurer.*

EDMONTON CENTRE

The Edmonton Centre held eight regular meetings during the year, including the annual dinner meeting. There was one formal and one informal Council meeting.

At each meeting there was the regular talk on the HANDBOOK, and sometimes a simple demonstration or discussion of an astronomical topic. These were followed by the main addresses which are summarised below:

December 14, 1939—Shakespeare and the Stars, by S. W. Dyde.
January 11, 1940—Measuring the Universe, by C. G. Wates.
February 8—Planets on Display, by C. P. Willoughby.
March 14—The Rotation of the Earth and Some of its Consequences, by H. E. Johns.
April 11—A History of Time Measurement, by Jean McDonald.
May 9—Early Astronomical Instruments, by E. S. Keeping.
October 10—A Transit of Mercury, by J. W. Campbell.
November 14—Stellar Spectra and Evolution, by E. H. Gowan.

The annual picnic near the end of October turned into a pleasant discussion since the clouds prevented observation.

The roll of the Centre now consists of 45 regular members (of whom 9 have not paid current dues). There are 7 associate members, 3 of whom are newly elected and start with the 1941 fee year.

E. H. GOWAN, *Secretary.*

FINANCIAL STATEMENT, 1940

I. GENERAL TREASURER

GENERAL ACCOUNT No. 4359

Receipts		Disbursements	
Balance from 1939	$1,079.17	Publications	$2,266.86
($234.84 belongs to Southam Press Fund)		Public Meetings	67.31
Grants received	2,270.00	Library	115.62
Fees	1,799.00	Stamps and Stationery	328.71
Publications	626.27	Salary, Assistant Treasurer	780.00
Interest	113.04	Grants to Centres	568.00
Miscellaneous	24.34	Rent	120.00
		Janitor	18.00
		Bank Charges	4.80
Totals	$5,911.82	Miscellaneous	288.74
		Balance to 1941 ($112.30 belongs to Southam Press Fund).	1,353.78
			$5,911.82

LIFE MEMBERS' ACCOUNT No. 4390

Receipts		Disbursements	
Balance from 1939	$170.21	Dominion of Canada Bonds	$150.00
Bank Interest	.46	Bank Balance to 1941	95.67
Life Members' Fees	75.00		$245.67
Totals	$245.67		

BUILDING FUND ACCOUNT No. 4383

Receipts		Disbursements	
Balance from 1939	$690.15	Dominion of Canada Bonds	$650.00
Bank Interest	.91	Balance to 1941	242.17
Bond Interest	201.11		$892.17
Totals	$892.17		

SOUTHAM PRESS FUND

(Cash Balance Deposited in General Account No. 4359)

Receipts			
Balance from 1939	$234.84	Dominion of Canada Bonds	$200.00
Bank Interest	.20	Balance to 1941	112.30
Bond Interest	77.26		$312.30
Totals	$312.30		

SUMMARY OF BONDS HELD FOR R.A.S.C. BY IMPERIAL BANK

Account	*Brought Fwd.*	*Purchased*	*Carried Fwd.*	*Yearly Int.*
Life Members	$ 500.00	$ 150.00	$ 650.00	$ 22.80
Building Fund	5,000.00	650.00	5,650.00	201.11
Southam Press Fd.	1,700.00	200.00	1,900.00	77.26
Totals	$7,200.00	$1,000.00	$8,200.00	$301.17

Audited and certified correct, January 9, 1941.

F. L. HARVEY
ANDREW THOMSON } *Auditors.*

(Signed) J. H. HORNING, *General Treasurer, R.A.S.C.*

II. REPORTS OF TREASURERS OF CENTRES

TORONTO CENTRE

RECEIPTS		DISBURSEMENTS	
Balance from previous year..	$ 27.75	Rentals	$ 44.00
Members' Fees	297.00	Fees to General Treasurer....	297.00
Grant from General Council..	142.00	Postage and Stationery	23.76
Grant from Exhibition, re telescope on grounds	75.00	Fees and Expenses, Lectures	48.00
		Printing	19.59
		Floral Spray, late A. R. Hassard	4.00
		Insurance on telescope at Exhibition	5.00
		Expenses, re A.A.V.S.O. Convention, Lecturer's Expenses (Satterly)	6.34
		Rent of Hall	4.50
		Luncheon (Richmond Hill)	13.60
		Banquet (Hart House)	2.19
		Printing and Notices	7.46
		Balance carried forward	66.31
Totals	$541.75		$541.75

Audited and found correct, December 3, 1940.

(Signed) T. H. MASON, *Treasurer.*

OTTAWA CENTRE

Receipts		Disbursements	
Balance on hand from 1939 in Royal Bank	$ 88.79	Fees to General Treasurer	$109.00
Members' Fees (44)	102.00	Postage and Stationery	6.00
Grant from General Council	54.50	Expenses of Meetings	3.00
Bank Interest for 1940	.39	Miscellaneous Expenses	3.00
		Balance carried forward	124.68
Totals	$245.68		$245.68

Audited and found correct, December 3, 1940.

(Signed) D. B. NUGENT, *Auditor.*

HAMILTON CENTRE

Receipts		Disbursements	
Balance from previous year	$12.84	Rentals	$20.00
(42½) Members' Fees	85.00	Fees to General Treasurer	86.00
Grant from General Council	43.00	Postage and Stationery	8.00
Bank Interest	.14	Expenses re Meeting	9.00
Field Night	4.50	Printing	11.25
Donations	7.75	Balance carried forward	18.98
Totals	$153.23		$153.23

Audited and found correct, December 10, 1939.

WM. FINDLAY, *Auditor.*

H. B. FOX, *Treasurer.*

WINNIPEG CENTRE

Receipts		Disbursements	
Balance from previous year	$27.61	Rentals	$14.50
Members' Fees (1940)	58.00	Fees to General Treasurer	58.00
Grant from General Council	30.00	Postage and Stationery	8.75
Bank Interest	.34	Expenses re Meeting	4.50
Exchange	.20	Exchange	.15
		Balance carried forward	30.25
Totals	$116.15		$116.15

VICTORIA CENTRE

Receipts		Disbursements	
Balance from 1939	$ 64.31	Rent	$ 12.50
Dues from Members:		Printing and Mimeographing	13.13
Life $ 25.00		Dues to Toronto	150.00
Ordinary 151.00		Postage	2.57
Junior 8.00		Expenses re Lectures	7.00
	184.00	Exchange	.40
Grant from General Council	76.00	Annual Dinner, 1939	2.70
Balance from Summer Course	5.84	Grant to Library	14.33
Bank Interest	.54	Miscellaneous:	
		Stocker's $ .50	
Totals	$330.69	Flowers 7.00	
		Stamped Envelopes 3.60	
		Telegram 1.30	
			12.40
		Total Disbursements	$215.03
		Bank Balance	103.94
		Cash on hand	11.72
			$330.69

Audited and found correct, December 12, 1940.
(Signed) J. A. PEARCE.
PHOEBE RIDDLE, *Secretary-Treasurer*

EDMONTON CENTRE

Receipts		Disbursements	
Balance from previous year..	$ 96.17	Janitor's Services	$ 6.00
Members' Fees	78.00	Fees to General Treasurer	68.00
Grant from General Council (net)	34.85	Postage and Stationery	4.00
For Extra Hand Books, etc.	1.50	Expenses re Meetings	9.20
Bank Interest	1.54	Annual Banquet (Guests)	1.50
		Hand Books	1.00
Totals	$212.06	"The Sky" Magazine	2.86
		Bank Charges on Cheques	.25
		Balance carried forward	119.25
			$212.06

Audited and found correct, November 18, 1940.
H. L. LEAVER, *Auditor.*
E. N. HIGINBOTHAM, *Treasurer.*

MONTREAL CENTRE

Receipts		Disbursements	
Cash on hand and in Bank October 15, 1939	$248.76	Membership Fees remitted to General Treasurer	$178.00
Members' Fees (89 at $2.00 each)	178.00	Mimeographing Letters re Meetings and Notices	2.00
Grant from General Treasurer, Toronto	109.50	Sundry Expenses re Meetings, including Lecturers' Travelling, Janitor and Lantern Service, Films, etc.	65.90
Interest on Bank Deposits	4.14	Postage	7.10
		Stationery	4.96
		Secretarial Assistance	3.50
		Sundry General Expenses	1.40
		Library Expense, Subscription to "Telescope"	1.00
		Leaving Balance on hand October 15, 1940, of in the Bank of Montreal.	276.54
Totals	$540.40		$540.40

Audited and found correct, October 23, 1940.

O. A. FERRIER, C.P.A.,
(*Certified Public Accountant*).
HENRY F. HALL, *Treasurer*.

LONDON CENTRE

Receipts		Disbursements	
Balance from previous year..	$ 3.04	Rentals	$ 6.00
Members' Fees (39)	78.00	Fees to General Treasurer	74.00
Grant from General Council	47.00	Postage and Stationery	22.26
Bank Interest	.17	Expenses re Meetings	8.60
		Balance carried forward	17.35
Totals	$128.21		$128.21

Audited and found correct, December 13, 1940.

RANDAL H. COLE.

VANCOUVER CENTRE

Receipts		Disbursements	
Balance from 1939	$ 32.45	Rental	Nil
Grant from Council	30.75	Fees to General Treasurer	$ 60.00
Bank Interest	.22	Lecturers	14.50
Fees paid during 1940	60.00	Postage for Treasurer	1.25
		Balance carried forward	47.67
Totals	$123.42		$123.42

Audited and found correct, December 30, 1940.

LAURA ANDERSON, *Treasurer*.

OFFICERS FOR 1941

The Secretaries of the various Centres report the following officers elected for 1941.

Toronto Centre

Honorary Chairman—Dr. C. A. Chant
Chairman—D. W. Best, D.D.
Vice-Chairman—Miss Ruth J. Northcott, M.A.
Secretary—F. L. Harvey, 3019 Queen St. E.
Treasurer—T. H. Mason
Recorder—F. L. Troyer
Curator—R. S. Duncan
Council—Dr. D. S. Ainslie; Dr. L. Gilchrist; Dr. J. F. Heard; Dr. F. S. Hogg; J. H. Horning, M.A.; Dr. P. M. Millman; Rev. C. H. Shortt; Tracy D. Waring; Dr. R. K. Young; W. T. Patterson, R.O.; Miss E. M. Fuller, B.L.S.; and Past Chairmen—A. F. Miller; J. R. Collins and E. J. A. Kennedy

Ottawa Centre

Honorary President—Miss Miriam S. Burland
President—F. W. Matley
First Vice-President—Dr. T. L. Tanton
Second Vice-President—Hoyes Lloyd
Secretary—Malcolm M. Thomson, Dominion Observatory
Treasurer—Andrew C. Steedman
Council—Mrs. A. A. Lowes; C. B. Bailey, K.C.; W. W. Nichol, B.A.; D. B. Nugent, B.A.; Dr. R. J. McDiarmid; and Past Presidents—John McLeish, B.A.; A. H. Miller, M.A.; and R. G. Madill, B.A.

Hamilton Centre

Honorary President—W. T. Goddard
President—N. H. Broadhead
Vice-President—H. B. Fox
Secretary-Treasurer—J. R. Graham, 39 London St. N.
Curator—T. H. Wingham
Council—Wm. Findlay, PhD.; A. E. Johns, PhD.; George E. Campbell, M.A.; F. H. Butcher, B.A.; Rev. E. F. Maunsell; J. A. Marsh; W. S. Mallory, B.A.; T. M. Norton

Winnipeg Centre

Honorary President—Mgr. T. W. Morton
President—L. W. Koeser
First Vice-President—V. C. Jones
Second Vice-President—Miss O. A. Armstrong

Secretary—Miss M. E. Watterson, 612 Toronto General Trusts Building
Treasurer—R. S. Evans
Council—R. D. Colquette; L. J. Crocker; C. A. E. Hensley; W. P. Johnson; H. E. Riter; A. W. Smith; A. V. Thomas; Prof. L. A. H. Warren; P. C. Watt; Press Secretary, Miss O. A. Armstrong

Victoria Centre

Honorary President—Gordon Shaw
President—R. M. Petrie, M.A., Ph.D.
First Vice-President—Capt. Wm. Everall
Second Vice-President—O. M. Prentice
Secretary-Treasurer—Miss Phoebe Riddle, B.A., 804 Seymour Ave.
Recorder—K. O. Wright, Ph.D.
Librarian—Miss C. Hailstone
Council—Wm. Hobday; Miss Y. Langworthy; J. M. McHutchon; Dr. A. McKellar; Miss M. Oliphant; J. Smith, M.Sc.; W. Stilwell, M.A.

Montreal Centre

Honorary President—Mgr. C. P. Choquette
President—Frank J. de Kinder
Vice-President—G. Harper Hall
Secretary-Treasurer—Henry F. Hall, Sir George Williams College, 1441 Drummond St.
Council—Dr. C. C. Birchard; A. M. Donnelly; O. A. Ferrier; G. R. Lighthall; W. E. Lyman; F. P. Morgan; E. R. Paterson

London Centre

Honorary President—Dr. H. R. Kingston
Past President—Rev. W. G. Colgrove, M.A., B.D.
President—T. C. Benson
Vice-President—Dr. G. R. Magee
Secretary-Treasurer—Dr. Randall H. Cole, University of Western Ontario
Council—M. O. Culbert; E. E. O'Connor; Rev. M. E. Conron; Mrs. H. Davidson; Mrs. G. E. Wood

Vancouver Centre

Honorary President—Dean D. Buchanan
President—Capt. C. A. Macdonald
Vice-President—Dr. A. M. Crooker
Treasurer—Mrs. Laura Anderson
Recording Secretary—Dr. K. C. Mann, University of British Columbia
Corresponding Secretary—Dr. H. D. Smith, University of British Columbia
Council—C. Jorgensen; Mrs. C. A. Rogers; E. C. Thrupp; F. R. Stewart; A. Outram; Dr. R. Hull; C. E. Bastin; N. D. B. Phillips; Dr. G. M. Volkoff

EDMONTON CENTRE

Honorary President—DR. J. W. CAMPBELL
President—H. R. LEAVER
Vice-President—MRS. J. A. CLARKE
Secretary—DR. E. H. GOWAN, University of Alberta
Treasurer—E. N. HIGINBOTHAM
Librarian—E. S. KEEPING, PH.D.
Council—JOHN BLUE; C. G. WATES; MISS A. M. P. SMITH; C. P. WILLOUGHBY; A. B. MCKIM

RECENTLY ELECTED TO THE SECTION "MEMBERS AT LARGE"

WATSON, MICHAEL L.....6 Sibley Place, Rochester, N.Y.
PARHAM, CLARENCE W., SR.....2354 Woolsey St., Berkeley, Calif.
RAWBONE, TED.....Wawata, Sask.
HOLT, WM. L., M.D.....1747 East 5th St., Tucson, Ariz.
EHRENFELD, HARRY W.....12 Broad St., Flemington, N.J.
BRILLANT, JACQUES.....34 Belzile St., Rimouski, P.Q.
CARRAGAN, G. HOWARD.....Rensselaer Polytechnic Institute, Troy, N.Y.
DODSON, RICHARD S., JR.....528 Cumberland Ave., Teaneck, N.J.
DUFFIE, J. W.....3405 Vendome Avenue, Apt. 2, Montreal, P.Q.
MYERS, FRANCIS.....823 West 3rd St., Erie, Penna.
BEERLING, E.....312 32nd Street West, Saskatoon, Sask.
SCHMIDT, JOSEPH O.....3169 Whitethorn Rd., Cleveland Heights, Ohio
BAKER, RICHARD F.....615 Jefferson Ave., Niagara Falls, N.Y.
HARTMAN, STANDISH C.....Flemington Stone Works, Flemington, N.J.
BRUNTON, FOSTER D.....Agana, Guam Island, U.S.A.
HARDER, R. G. W.....2734 Grand Avenue, Davenport, Iowa
CALDER, FREDERIC W.....Box 166, Glace Bay, Nova Scotia
CAVE, T. R., JR.....265 Boswell Ave., Long Beach, Calif.
HAMMOND, C. R.....1004 North Howard St., Glendale, Calif.
VARLAS, S. T.....2969 Main St., Weirton, W. Va.
RUZIEKA, STANLEY.....Box 271, Grand Forks, B.C.
HOLMGREN, W.....817 Carbonate St., Nelson, B.C.
BALL, LESLIE M.....159 Light St., Woodstock, Ont.
MORROW, J. J.....221—21 St. West, Prince Albert, Sask.
CONNORS, JOHN.....666 Jamestown St., Philadelphia, Pa.
WILDS, WILLIAM E.....615 Le May Avenue, Detroit, Mich.
FAIRBANKS, F. C.....Dept. of Physics, U. of Roch., Rochester, N.Y.
HARRIS, SYLVAN.....222 Centre Avenue, New Rochelle, N.Y.
JOYNER, H. R.....Box No. 84, Silver City, North Carolina
PERKINS, FRED J.....2800 Terminal Tower, Cleveland, Ohio
FRANKLIN, ROBERT E.....1806 Valentine St., Houston, Texas

NOTES AND QUERIES

Communications are invited, especially from amateurs. The Editor will try to secure answers to queries.

Sparkling Sirius

Query

On Tuesday, February 4, at about 7.30 p.m. my daughter called my attention to the strange behaviour of a star. It was a "blue" star, but was blazing away at such a rate as I had never seen before. As it blazed, it flashed red and became such a size, then smaller, then larger and blazing and coloured again. When my other daughter came home and watched it she too was surprised, for she is a star lover, and she said "it was to the lower left of Orion." But by this time it was beginning to "calm down", so she did not see it at its best—or worst. It looked like a terrible conflagration! About 9.30 I looked again, but it appeared quite normal, an ordinary bright blue star, twinkling away as though nothing unusual had taken place. I wonder! Was that just an ordinary occurrence, or had anything unusual happened?

—Mrs. M. A. S., Guelph, Ont.

Answer

The star was undoubtedly Sirius, the brilliant Dog Star. When near the horizon it twinkles vigorously and if the atmosphere is much disturbed it flashes out red and green. Tennyson (*The Princess*, Part V, l. 263) describes this behaviour in a charming way:

> . . . as the fiery Sirius alters hue
> And bickers into red and emerald.

At certain times the colour-flashes of Sirius are very pronounced. Quite recently an observer on a ship of the United States Navy reported that when near the equator on the Pacific Ocean he was taking a sight on Sirius, then not far above the horizon, and he noted startling changes in colour. On looking at it through binoculars he was able to recognize nearly all the colours of the spectrum exhibited in the changes.

C. A. C.

The last Sun-spot Maximum

The precise time during the years 1937, 1938 when the spottedness on the sun's disc was greatest seemed very confusing to those who were regularly observing the sun. Early in 1937 the disturbance appeared to have reached its greatest value, but it still continued high and about the middle of 1938 seemed to become even greater than before. We had to wait until the complete records could be considered. The final "relative sun-spot numbers" up to the end of 1939 have been computed at the Central Bureau in Zürich, Switzerland, and are reported by Dr. W. Brunner. The last minimum was in 1933. The relative sun-spot number R and the number of spotless days N for the years 1933-1940 are given below. The provisional numbers for the first two quarters of 1940 are also added.

Year	R	N	*Year*	R	N
1933	5.7	240	1938	109.6	0
1934	8.7	154	1939	88.8	0
1935	36.1	20	1940 Jan.-Mar.	67.3	
1936	79.7	0	1940 Apr.-June	67.0	
1937	114.4	0			

The smoothed curve supplied by Brunner gives the date of the maximum about May 1, 1937.

C. A. C.

Red Rays and Fog

There has been a widespread belief that red or infra-red rays are especially powerful in penetrating fog, but in a recent lecture at Columbia University Dr. Sverre Petterson, professor of meteorology at the Massachusetts Institute of Technology, stated that such is not the case. The belief that this was possible arose, it appears, from the improper use of a formula for the transmission of light through a medium in which fine particles are suspended, but the formula is valid only when the particles are of about the same size as a wave-length of light. The average diameter of fog droplets is given (by Humphreys) as 0.005 mm., and some are much larger. The limit of visible red light is 8000 A or 0.0008 mm., or the ratio of fog diameter to wave-length is about 6 to 1. *Science Service* quotes Dr. Petterson as saying: "There is no region of the radiant energy spectrum which will penetrate fog better than visible light. This result has been confirmed by direct measurement."

C.A.C.

MEETINGS OF THE SOCIETY

AT TORONTO

March 19, 1940.—The regular meeting was held in the McLennan Laboratory, University of Toronto. Mr. S. C. Brown presided.

The speaker of the evening was Professor G. H. Reavely, of the Department of Geology, University of Western Ontario. His subject was "A Geologist looks at Meteorites".

Professor Reavely pointed out that as a geologist he was most interested in the actual composition of meteorites, to compare them with terrestrial materials. Meteorites are the only tangible evidence we have of material outside the earth and for this reason are of particular interest.

Not all the known elements are found in meteorites. The most abundant elements are: aluminium, calcium, silicon, iron, magnesium, nickel, oxygen and sulphur. The mineral content is of most interest to the geologist, and he has found that some of the minerals found in meteorites are not found in terrestrial rocks.

Meteorites can be divided into three ill-defined groups: (1) iron meteorites, known as "siderites", (2) iron-stone meteorites, known as "siderolites", and (3) stone meteorites, known as "aerolites". Of these the stony meteorites are of the most interest to the geologist because of the large number of minerals contained in them.

The first thing that is noticed when studying a meteorite is its crust, which is due to superficial fusion of the surface in its flight through the earth's atmosphere. The thickness of the crust is somewhat thinner at the nose and thicker at the back, though the thickness, and of course the colour, also depend on the composition and texture of the meteorite. The crust is made up of several zones: (1) an outer opaque zone, (2) an inner zone of more constant thickness which is impregnated with other transparent minerals, (3) a third zone of largely opaque matter and of irregular depth. Professor Reavely found the crust of the Dresden Meteorite to be very uneven and to be comprised of three zones.

Iron meteorites have a fairly regular structure. By etching a polished surface of the meteorite, figures known as Widmanstätten lines appear, which are the outcrop of the plate-like arrangement of the mineral alloys. Iron crystallizes in octahedra, so that various patterns are obtained depending on the way the sections are cut. Difficulties in identifying the substances arise from the imperfect development of the crystals and also because of staining by ferrous chloride.

The structure of over 90 per cent. of stony meteorites is characterized by the presence of small rounded grains known as chondrules. These chondrules are never found in terrestrial rocks. They may vary in size from sub-microscopic to the size of a walnut, and the majority are about a millimetre in

diameter. These chondrules may be made of several minerals, the most common of which is chrysolite. Sometimes one chondrule is found inside another. The chondrules are foreign to the ground mass of the meteorite, for they often have a dark boundary around them. Some of the crystals found in the chondrules would take thousands of years to grow, but the actual conditions that have brought about their formation are not well understood.

Professor Reavely then discussed some of his findings about the Dresden Meteorite. This meteorite is an aerolite, and has a high iron-nickel content of 27.26%. There are plenty of chondrules of about 2 mm. diameter, and the meteorite is well stained brown, though it is not all stained to the same extent. It was difficult to get thin sections of this meteorite because of its fairly loose structure which tends to break up when polished thinner.

Professor Reavely showed thin sections of the meteorite and compared these with similar sections of terrestrial rocks.

Dr. P. M. Millman expressed a very sincere vote of thanks to Professor Reavely for his very excellent lecture. He also pointed out that astronomers have no good explanation of the evolution of the stars or of the solar system. He expressed the hope that when more is known of the structure of meteorites it may lead to a clue to the problem of evolution.

December 3, 1940.—The regular meeting of the Toronto Centre was held in the McLennan Laboratory, University of Toronto. Mr. S. C. Brown presided.

The following were elected to membership in the Toronto Centre:

Dr. George Shanks, 36 Burton Road, Toronto.
Miss Brittiffe Swift, 24 O'Hara Avenue, Toronto.
Rev. J. D. Cunningham, Richmond Hill, Ont.

The speaker of the evening was Prof. A. Pitt, B.A., of the Department of Physics, University of Toronto. His subject was "Experiments with Short Radio Waves". The chief concern with radio is to transmit energy between distant points. The first experiments of this nature were done by Faraday about 1840. In 1853 Kelvin made the phenomenal prediction that in discharging a Leyden jar, the discharge is oscillatory with a period given by $T=2\pi\sqrt{LC}$. This was later verified. Maxwell in 1864 showed the identity of electrical and light waves. It was the experiments of Hertz, about 1888, that form the present basis of our radio. The fundamental phenomenon upon which all radio sets operate was discovered two years later by Lodge.

Mr. Pitt then described the various wave-length bands and pointed out that the commercial band is rather narrow, and that it would be a great advantage to use shorter wave-lengths commercially.

The early Hertzian oscillator and detector were described. The later arrangement of the Lodge coherer clapper made it possible to send definite signals, but was only usable over short distances. Mr. Pitt had this experiment set up. Other advances were described, the most important of which was the development of the three-electrode tube, which gave an almost unlimited range of reception.

The wave-length band used by amateur radio operators has been restricted by the government, resulting in many advances being made by these amateurs since they have had to use shorter and shorter wave-lengths. However, for wave-lengths shorter than 10 m. a different method of transmitting is necessary, for these short waves are not reflected by the ionized layer in the earth's atmosphere as are the longer waves. It is necessary to transmit these very short waves in a beam.

Many experiments were shown. A particularly interesting one illustrated how short waves are reflected—even from a man's body. A tremendous amount of research is being carried out in this field at the present time, and startling results may be expected in the future.

Dr. Ainslie moved a very sincere vote of thanks to Prof. Pitt for his most interesting lecture.

Dr. Millman showed a slide of the predicted path of Comet Cunningham and briefly discussed changes in brightness that may be expected. Early in January will probably be the best time to observe it.

RUTH J. NORTHCOTT, *Recorder.*

AT VANCOUVER

October 8, 1940.—The seventy-third meeting of the Vancouver Centre was held in Room 200 of the Science Building of the University of British Columbia. The President, Capt. C. A. McDonald, was in the chair and introduced the speaker of the evening, Capt. Angus Paterson, of the firm of Frederick Goertz Ltd., scientific instrument makers, who gave a very interesting and informative address on "The Gyro-Compass".

After some opening observations on the history and disadvantages of the magnetic compass, a description was given of the physical principles involved in the construction and operation of the gyroscopic compass. The roles played by Foucault and Lord Kelvin in the early study of the directional properties of the gyroscope were stressed. The first sea-going gyro-compass was made by Dr. Anschutz, and errors in its construction and operation were eliminated later by S. G. Brown of London, who patented a very successful gyroscopic compass which revolved at a speed of 14,000 revolutions per minute.

The speaker had brought one of the latest types of the Brown gyro-compass to the meeting and used it throughout his lecture to illustrate the rather complicated motions involved producing a true north-seeking instrument.

In his concluding remarks, Capt. Paterson dealt briefly with the use of gyroscopic instruments in the modern aeroplane and their value in night flying.

An enthusiastic discussion followed this excellent address, after which the President expressed the thanks of the audience to the speaker.

November 12, 1940.—The seventy-fourth meeting of the Vancouver Centre was held in the University of British Columbia with the President, Capt. C. A. McDonald, in the chair. The Honorary President of the Centre, Dr. J. A.

Pearce, Director of the Dominion Astrophysical Observatory at Victoria, was scheduled to speak on "Recent Researches on Binary Systems and Eclipsing Variables". Unfortunately, owing to illness Dr. Pearce was unable to visit us, much to the disappointment of the members of the Centre. However, Dr. Andrew McKellar, of the Observatory staff, kindly consented, on short notice, to speak on "Recent Advances in Our Knowledge of Interstellar Material". The lecture proved to be one of more than ordinary interest to the audience, as it was based on recent discoveries made by Dr. McKellar during the course of spectroscopic researches at the Astrophysical Observatory on the "composition" of interstellar space. The term "interstellar space", as used by the speaker, referred to the vast regions between the millions of stars that go to make up our own galaxy or milky-way system of stars, where each star is separated, on the average, from its neighbour, by eight light years, or 48 million million miles.

In view of the known ejection of large masses of materials in the form of "gaseous prominences" from the sun and other stars, it appears probable that interstellar space may not be "empty". Three lines of evidence indicating that material exists in interstellar space were presented by the speaker. Firstly, so called "dark nebulae" are accepted now as consisting of obscuring clouds of matter which cut off our view of the more distant stars in our galactic system. Secondly, a study of the spectra of certain O- and B-type stars shows that the more distant the star, the greater is the "scattering" of its light in its journey through interstellar space, presumably by finely divided matter of molecular or atomic dimensions. Thirdly, the spectroscopic study, with instruments of the highest power, of the light of distant stars reveals certain sharp lines that differ from ordinary stellar absorption lines. During the past few years, certain of these have been shown to be due to the absorption of light by atoms of calcium, potassium and titanium present in interstellar space. Dr. McKellar's very valuable contribution, made in recent months, has been to demonstrate that certain lines are due to the presence of definite diatomic molecules of CH, CN, and NaH in interstellar space. It would appear also, that the temperature to be associated with the matter in interstellar space would be only two degrees Centigrade above the absolute zero. Estimates of the density of this interstellar matter yield a value of 10^{-25} grams per cc., or of the order of a millionth of one millionth of the density in the best vacuum obtainable on earth.

An enthusiastic discussion followed this inspiring lecture, after which a hearty vote of thanks was moved for the speaker.

December 10, 1940.—The seventy-fifth meeting of the Vancouver Centre of the Royal Astronomical Society of Canada was the Annual Meeting for the year 1940, and was held in the University of British Columbia at 8.15 p.m. Forty-one members were present. Capt. C. A. McDonald was elected President of the Centre for a third year, and tribute paid to the excellent work he has done in building up an organization of enthusiastic members in Vancouver. Dr. A. M. Crooker and Mrs. Laura Anderson were returned to office as Vice-

President and Treasurer, respectively, while Dr. K. C. Mann as recording secretary and Dr. H. D. Smith as corresponding secretary were installed in new offices. The Council remained the same except for the election of Dr. G. M. Volkoff as a new member.

Unfortunately, owing to illness, our speaker for the evening, Mr. R. A. McCauley, Director of the Meteorological Service at the Sea Island Airport, was unable to give his lecture on "The Sun, A Variable Star".

A very pleasant and instructive hour was spent in the inspection of an apparatus, brought to the meeting by Mr. H. Hayward of White Rock, B.C., designed for use in the teaching of astronomy in secondary schools. This very unique system of lights, mirrors, etc., might be called a type of portable miniature planetarium. It illustrates in a very ingenious manner phenomena associated with diurnal and seasonal changes, eclipses of moon and sun, etc.

This interesting demonstration was followed by a very entertaining half-hour discourse by Dr. A. M. Crooker on "The Sky at 6 O'Clock To-night", in which the positions of first magnitude stars and important constellations were indicated clearly by means of exceptionally well drawn blackboard diagrams.

An expression of thanks to the two speakers by the President brought to a close a very enjoyable evening.

H. D. Smith, *Secretary.*

AT WINNIPEG

December 11, 1940.—The regular meeting of the Winnipeg Centre, was held in the University of Manitoba. Mr. L. J. Crocker, president, was in the chair.

As this meeting was the last of the year the president gave the address. The subject was "Mars, up to date."

Of all the wandering planets, Mars is the most favourable for observation. Its revolution period is 687 days, its distance from the sun half as far again as the earth's, its rotation period is a little more than 24½ hours. The best time for observation is when the planet is in "opposition," and this occurs every 780 days. But some oppositions are much more favourable than others. Such occur at intervals of 15 or 17 years. In 1924 was an exceptionally close opposition; there was a good one in 1939, and there will be a better one in 1941.

In 1877 the two moons of Mars were discovered. These helped in calculating the mass of Mars, which was found to be one-tenth that of the Earth. The moons give very little light to Mars. The atmospheric pressure on Mars is low, the gravity 40 per cent. of ours.

It is very difficult to determine the nature of the surface markings of Mars. This is partly due to Mars' phase being never less than "three days from full." The finer markings, even when viewed with a large telescope, are as fine as the grain on the photographic plate and if time-exposures are used the disturbances of the earth's atmosphere blur these details.

Information has been given through the centuries by Galileo, Huygens, Cassini who noted the south polar cap, Herschel who marked the seasonal changes, Schiaparelli, who observed and named the *canali* which he said connected lakes

and seas but never ended in the continents. These *canali* appeared double at times. Percival Lowell spent a considerable fortune and much of a lifetime investigating the planets and especially Mars. He gave the explanation of vegetation causing the changing colours. Of 500 canals he thought one-tenth were double from the components being 50 to 400 miles apart. Cosmically speaking, he thought Mars was soon to dry up and that would end the life of the Martians. Among the astronomers who differ from Lowell's theory are Barnard, Waterfield and Spencer Jones.

Recent knowledge is being gained through spectrum analysis, improved photography and the giant telescopes. Photographs taken with an infra-red filter, it is thought, should penetrate clouds but when such photos are taken of Mars the polar caps do not show. Photographs taken with an ultra-violet filter should not penetrate clouds, but when such photographs are taken the polar caps do show. Hence the polar caps, it is argued, are atmospheric, composed perhaps of ice spicules from a few inches to six feet in thickness.

By superimposing the above two kinds of photographs on each other the atmosphere is found to be 50 to 60 miles deep. The air on the planet is thought to be very tenuous. White clouds at a height of twelve miles form at noon and grow in the afternoon. These are perhaps condensed moisture. Yellow clouds, low in the atmosphere, may remain for two weeks and are perhaps sand storms. The spectrum has only once shown water-vapour on Mars. Oxygen is about one-thousandth as plentiful as on the earth but the colour of the rocks seems to indicate that they are oxidized. The temperature of the surface varies from 50° F. to −130° F.

OLIVE ARMSTRONG, *Secretary.*

AT OTTAWA

December 3, 1940.—At the annual meeting of the Ottawa Centre of the Royal Astronomical Society of Canada, held in the Lecture Hall of the National Museum, the following officers for 1941 were elected by ballot: (The list is given on page 125).

Mr. Miller and Mr. Loyd moved a hearty vote of thanks and appreciation for the untiring efforts of the president, Miss Burland, who in the new year will hand over the reigns of office to Mr. Frank Matley.

The secretary, Malcolm M. Thomson, read the reports of the secretary and treasurer, indicating both an increase in membership and a favourable financial standing. Continued activity was reported in the observation of meteors, and in the recording of auroral activity. Mention was made of the telescope making on the part of Messrs. A. C. Steedman, Maxwell Miller, and Wm. T. Brown, and of the planetarium constructed by Mr. Valmer Nixon.

Mr. John McLeish and Dr. T. L. Tanton moved a vote of thanks to the Ottawa Press, Radio Station CKCO, and the officials of the National Museum for kindnesses during the past year.

MALCOLM M. THOMSON, *Secretary.*

UNIVERSITY OF ATHENS
Solonos 57
ATHENS—GREECE

Athens, December 1940.

To all Astronomers of the World!

The heroic Euzone, as a new Perseus, escorted by the winged Pegasus of the British Royal Air Force and holding in his hand his gun with glittering bayonet fixed upon it, not less terrifying than the head of Medusa, is struggling hard on the rocky mountains of Epirus and Albania to free Humanity, menaced by the Fascist tyranny in the same way as Andromeda once was, when offered as a prey to the horrible mythological Cetus.

A warm appeal is therefore addressed to all of you, pupils of Pythagoras, Aristarchus, Hipparchus and Ptolemy, who from your lofty and peaceful temples of Urania follow this immortal drama of the Hellenic Mythology, pictured for ever with twinkling stars on the firmament and actually played on this miserable planet. You, selected members of the spiritual aristocracy, kindly use among the free minded people of the civilised world the valuable influence of your privileged post of high thinkers with a view to secure moral or material assistance to the eternal Hellas, fighting once more for freedom and independence.

The innocent victims of the Fascist air raids, the martyrs of the Italian persecution, which is oppressing the Hellenic islands of the Dodecanese, and those whose breasts are a bulwark against the Roman invaders will surely feel grateful to all defenders of our rights and supporters of our sacred fight for liberty of mankind.

S. PLAKIDIS,
Professor of Astronomy.

The Royal Astronomical Society of Canada

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AMATEUR TELESCOPE MAKERS

The war-time work in the optical industry has created an urgent need of workmen qualified to grind, finish, and test optical surfaces. Will those amateurs in Canada who have made one or more mirrors or lenses communicate with the undersigned, giving their experience in optical work, present occupation and qualifications?

R. K. YOUNG,
Director, David Dunlap Observatory

Richmond Hill, Ont.